PROJECT DESIGN AND IMPLEMENTATION

The CleanFleet alternative fuels demonstration project evaluated five alternative motor fuels in commercial fleet service over a two-year period. The five fuels were compressed natural gas, propane gas, California Phase 2 reformulated gasoline (RFG), M-85 (85 percent methanol and 15 percent RFG), and electric vans. Eight-four vans were operated on the alternative fuels and 27 vans were operated on gasoline as baseline controls. Throughout the demonstration information was collected on fleet operations, vehicle emissions, and fleet economics. In this volume of the CleanFleet findings, the design and implementation of the project are summarized.

Introduction

Alternative motor fuels are viewed by some policy makers as potentially viable options for addressing two problems facing the transportation sector of the United States economy. First, they are said by some to be "clean burning" fuels; and, as such, they could be used to reduce emission levels significantly from vehicles optimized to operate on them. Dramatic reductions in emissions are being mandated in urban areas across the nation that are not in compliance with the health-based national ambient air quality standard for ozone. Standards for carbon monoxide and concerns for greenhouse gases and "air toxic" emissions also must be addressed. Second, alternative fuels that are not derived from petroleum could provide more diversity for energy sources and reduce the country's dependence upon foreign oil. In spite of this potential, in the early 1990s a dearth of objective, practical information existed on the operational, emissions, and economic effects of using the leading available alternative fuel options.

Introducing alternative motor fuels into the economy requires the availability of reliable supplies of the fuels and vehicles built to use them. Both fleet operators and individuals must have confidence in the safety, reliability, and performance of the vehicles. Also, alternative fuel vehicles (AFVs) and the fuels themselves must be economically viable. In the 1990 time frame when the CleanFleet project was developed, the requisite conditions cited above did not exist; several critical gaps existed in the information base available to policy makers, fleet operators, vehicle manufacturers, and fuel suppliers. Among these gaps were the following:

- Objective, comparable data on the operations, emissions, and economics of several alternative fuel technologies
- Comprehensive sets of detailed operations and speciated emissions data on a significant number of vehicles over a sufficient period of time to provide meaningful results

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- Consistent information on employee acceptance, training requirements, and safety practices; and on local building code and fire marshall practices.

To address these needs, the CleanFleet project was designed to demonstrate and document the operational, emissions, and economic status of alternative fuel, commercial fleet delivery vans in the early 1990s for meeting air quality regulations in the mid to late 1990s. The project was designed to provide information on "daily, real-world, commercial operations" using AFV technologies that could be put into FedEx delivery service for a two-year period.

Six fuels were initially considered for study in CleanFleet as alternative fuels capable of being used in FedEx operations in the 1992 to 1994 time frame: compressed natural gas (CNG), propane gas (also called liquefied petroleum gas), California Phase 2 reformulated gasoline (RFG), methanol (M-85, 85 percent methanol and 15 percent RFG), ethanol (E-10, E-85, or ethyl tert-butyl ether (ETBE and RFG)), and electric vehicles (EVs). Five fuels were demonstrated (the ethanol industry declined to support the demonstration of an ethanol fuel). The choice of these fuels reflects the status of AFV technology and the driving forces of air quality and energy diversity.

Definitions of alternative fuels vary depending upon whether the driving force is primarily environmental or energy diversification. The Clean Air Act Amendments (CAAA) of 1990 delineate federal emission standards and clean fuel requirements.[1] Emission standards are set to prescribed levels without specifying motor fuels. The CAAA also provide for introduction of clean-fueled vehicles in the regions of the country classified as serious, severe, and extreme non-attainment areas for ambient ozone. The CAAA define the following fuels as clean alternative fuels: methanol, ethanol, other alcohols, reformulated gasoline, reformulated diesel (for trucks), natural gas, propane gas, hydrogen, and electricity. California's Low Emission Vehicle program sets a series of emission standards that are stricter than the federal standards.[2] California defines alternative fuels as including methanol, ethanol, natural gas, propane gas, electricity, or other clean-burning fuels.

Energy diversity drives alternative fuels from the federal level. The Alternative Motor Fuels Act (AMFA) of 1988 promotes demonstrations of alternative fuels and provides credits to determination of corporate average fuel economy (CAFE) for vehicle manufacturers for every AFV produced.[3] AMFA defines alternative fuels as methanol, ethanol, and natural gas.

Subsequently the Energy Policy Act (EPACT) of 1992 provides mandates for acquisition of AFVs by the federal government.[4] Provisions for other fleets in state government, alternative fuel providers, and companies in the energy business are also specified. Municipal and private fleets may be covered later. EPACT defines alternative fuels as including natural gas, propane gas, alcohol (methanol, ethanol, other alcohols), blends of alcohols with gasoline or other fuels in which the blend contains at least 85 percent alcohol by volume, hydrogen, fuels derived from biomass, liquid fuels derived from coal, and electricity.

Thus the five alternative fuels demonstrated in CleanFleet are a subset of alternative fuels defined in environmental and energy legislation. They are those fuels that both vehicle manufacturers and fuel organizations agreed to support in FedEx operations in the 1992 to 1994 time frame prior to the effective dates of regulations in the mid to late 1990s.

PROJECT DESIGN AND IMPLEMENTATION

This volume of the CleanFleet Findings describes the project design and implementation.[5,6] Information is provided on the following topics in this volume of report:

- Project Design

  — Experimental design
  — Fuels
  — Vehicles.

- Implementation

  — Fueling infrastructure
  — Building facilities
  — Training
  — Vehicle activity
  — Types of data collected
  — Public outreach
  — Close-out.

Results on operations, emissions, and economics are provided in the remaining volumes, Volumes 3 through 8.